

Amend a ferroelectric thin film epitaxially grown on said perovskite oxide thin film.

BASIS FOR THE AMENDMENT

Claim 1 has been amended in a manner as kindly suggested by the Examiner to overcome his objection thereto.

REMARKS

Favorable reconsideration of this application is requested.

Claims 1-7 are in the case. They stand rejected under 35 U.S.C. § 103 as being unpatentable over Nashimoto in view of Kim.

The invention relates to a multilayer thin film formed on an Si substrate by epitaxial growth, which comprises: a buffer layer formed on said Si substrate, which said buffer layer includes an oxide thin film, a perovskite oxide thin film formed on said buffer layer, which film has a (100) or (001) orientation, and a ferroelectric thin film epitaxially grown on said perovskite oxide thin film.

Since the ferroelectric thin film is formed using a primer layer of a perovskite oxide, the multilayer thin film has significantly superior properties and characteristics as compared to a multilayer thin film in the absence of such a primer layer.

As so stated by the Examiner at page 2 of his Action:

Nashimoto discloses a the epitaxial growth of MgO (100) on a silicon substrate with a (100) orientation and a Pt (100) layer grown on the MgO layer and a perovskite PbTiO_3 (001) film grown on the Pt film, where MgO reads on applicant's buffer layer. Nashimoto et al also discloses PZT could also be epitaxially grown on the MgO buffer layer and Pt thin film (col 7, ln 1-32).

The Examiner acknowledges that Nashimoto does not disclose a ferroelectric thin film grown on said perovskite oxide thin film. He thus relies on Kim to assertedly make obvious this deficiency of Nashimoto.

It is submitted that Applicants' discovery is not made obvious by the combination of these reference. Thus, while Kim teaches the deposition of a thin film made of only a perovskite seed by thinly depositing a material, such as PbTiO_3 , as a seed layer and then depositing a PZT thin film thereon, nevertheless, such does not make obvious the requisite modification of the multilayer of Nashimoto. Nowhere in the references is there any teaching which would motivate one to provide a PZT layer on the perovskite oxide thin film of the multilayer of Nashimoto. It is only Applicants' teaching that would make this obvious.

The Examiner states that it assertedly would be obvious to modify Nashimoto's invention with Kim's teaching of a PbTiO_3 layer as a seed for PZT because "a PZT thin film has good pyroelectricity, piezoelectricity and ferroelectricity and is widely employed for use in sensors, piezoelectric elements and memory devices".

Such, however, begs the question why in the absence of Applicants' teaching, one would provide for a ferroelectric thin film epitaxially grown on the perovskite on the oxide thin film of the multilayer thin film of the invention whereby superior results are obtained. No such or similar multilayer thin film is disclosed by Kim, nor would one expect or could have foreseen that by modifying the multilayer thin film of Nashimoto in a manner as claimed such would result in a structure of superior properties and characteristics. While a PZT thin film, per se, is known, certainly one could not have foreseen improved superior characteristics and properties when provided in the multilayer thin film of Nashimoto.

Accordingly, withdrawal of the rejection of the claims under 35 U.S.C. § 103 is requested.

With regard to the objection to the drawings, the Examiner in a discussion with him on August 1, 2002, agreed to withdraw it.

It is submitted that this application is now in condition for allowance and which is solicited.

Respectfully submitted,

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IN THE CLAIMS

--1. (Amended) A multilayer thin film formed on an Si substrate by epitaxial growth, which comprises:

a buffer layer formed on said Si substrate, which said buffer layer includes an oxide thin film,

a perovskite oxide thin film formed on said buffer layer, which film has a (100) or (001) orientation, and

a ferroelectric thin film epitaxially grown on said perovskite oxide thin film.--



Docket No.: 206645US0



ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

ATTORNEYS AT LAW

RE: Application Serial No.: 09/842,802
Applicants: Takao NOGUCHI, et al.
Filing Date: April 27, 2001
For: MULTILAYER THIN FILM, AND ITS
FABRICATION PROCESS AS WELL AS ELECTRON
DEVICE
Group Art Unit: 1765
Examiner: Song

SIR:

Attached hereto for filing are the following papers:

Amendment + Marked-Up Copy

Our check in the amount of \$0.00 is attached covering any required fees. In the event any variance exists between the amount enclosed and the Patent Office charges for filing the above-noted documents, including any fees required under 37 C.F.R. 1.136 for any necessary Extension of Time to make the filing of the attached documents timely, please charge or credit the difference to our Deposit Account No. 15-0030. Further, if these papers are not considered timely filed, then a petition is hereby made under 37 C.F.R. 1.136 for the necessary extension of time. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

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